



Shanghai AVIC OPTOELECTRONICS Co. Ltd

TFT COLOR LCD OPENCELL

(COMMON)

TMS190WX1-22TC

48cm (19.0W Type)

WXGA+

LVDS Interface (2port)

(Version 1.0)

Published by

Product Technology Department

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CONTENTS

CONTENTS	2
1. OUTLINE.....	3
1.1 STRUCTURE AND PRINCIPLE.....	3
1.2 APPLICATIONS	3
1.3 FEATURES.....	3
2. GENERAL INFORMATION	4
3. BLOCK DIAGRAM (FOR REFERENCE)	5
4. DETAILED SPECIFICATION.....	6
4.1 MECHANICAL SPECIFICATIONS	6
4.2 ABSOLUTE MAXIMUM RATINGS.....	6
4.3 ELECTRICAL CHARACTERISTICS	7
4.4 POWER SUPPLY VOLTAGE SEQUENCE AND RIPPLE.....	8
4.5 INTERFACE AND CONNECTOR PIN ALIGNMENT.....	10
4.6 LVDS I/F DATA CHART	11
4.7 DISPLAY COLORS AND INPUT DATA SIGNALS.....	12
4.8 INTERFACE TIMING.....	13
4.9 OPTICS (BASED ON TFT LCD MODULE TMS190WX1-19TB)	16
5. MARKINGS, PACKING, TRANSPORTATION AND DELIVERY	20
5.1 PRODUCT LABEL	20
5.2 PACKING	21
5.3 INSPECTION RECORD SHEET.....	21
5.4 TRANSPORTATION	21
5.5 SIZE AND WEIGHT FOR PACKING BOX.....	21
5.6 OUTLINE FIGURE FOR PACKING (For reference).....	22
6. PRECAUTIONS.....	23
6.1 ASSEMBLY AND HANDLING PRECAUTIONS	23
6.2 OTHER.....	23
7. OUTDRAWING.....	24



1. OUTLINE

1.1 STRUCTURE AND PRINCIPLE

TMS190WX1-22TC open cell is composed of the amorphous silicon thin film transistor liquid crystal display (a-Si TFT LCD) panel structure with driver LSIs for driving the TFT (Thin Film Transistor) array.

The a-Si TFT LCD panel structure is injected liquid crystal material into a narrow gap between the TFT array glass substrate and a color-filter glass substrate.

Color (Red, Green, Blue) data signals from a host system (e.g. PC, signal generator, etc.) are modulated into best form for active matrix system by a signal processing board, and sent to the driver LSIs which drive the individual TFT arrays.

The TFT array as an electro-optical switch regulates the amount of transmitted light from the backlight assembly, when it is controlled by data signals. Color images are created by regulating the amount of transmitted light through the TFT array of red, green and blue dots.

1.2 APPLICATIONS

- Monitor for PC

1.3 FEATURES

- a-Si TFT active matrix
- LVDS interface
- R.G.B input 8bit, 16.7 millions colors (6bit+Hi-FRC)
- Resolution WXGA+(1,440×900 pixels)
- High contrast ratio 1000:1
- High response time ($T_{on}+T_{off}=5$ ms)



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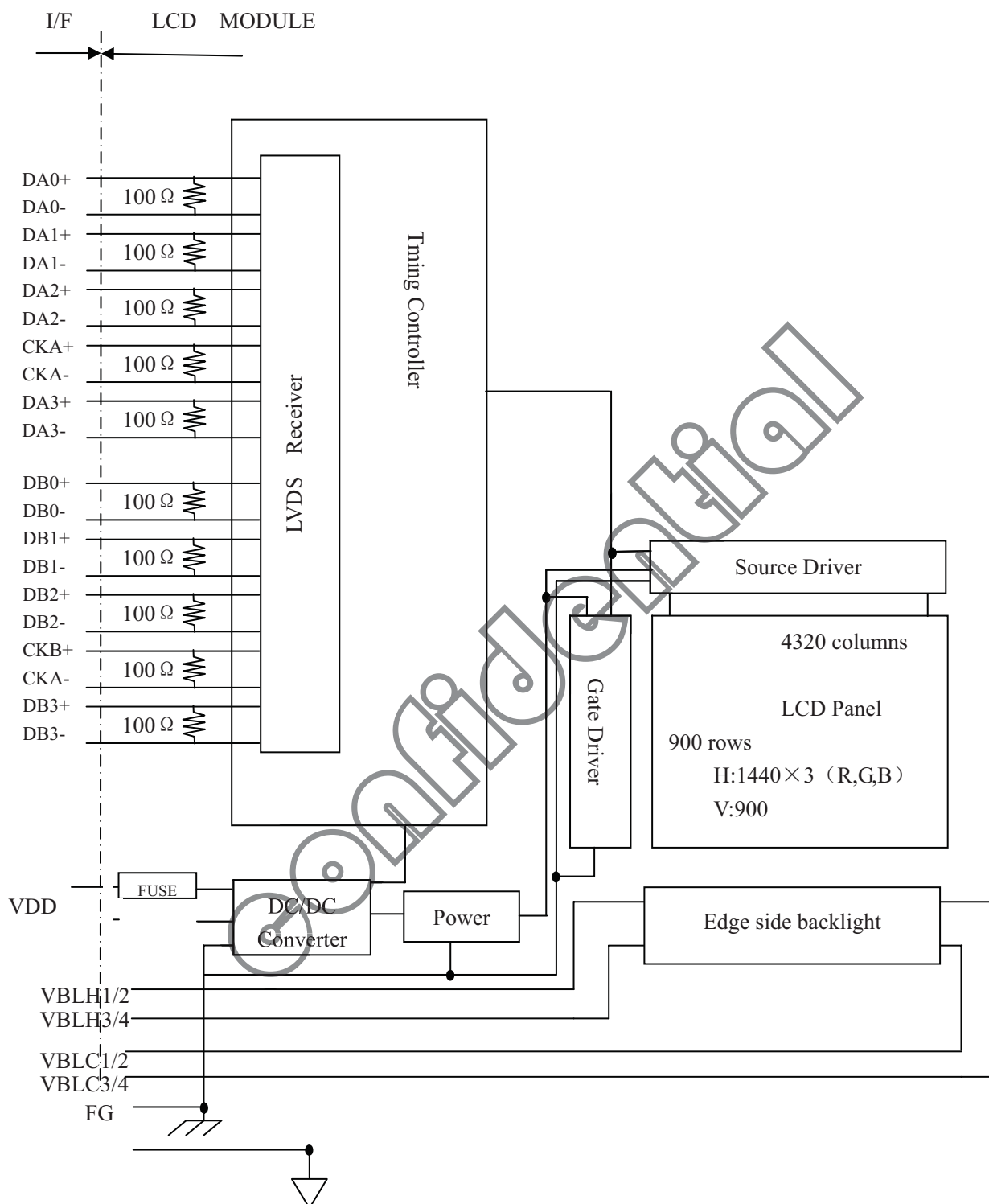
4/25

2. GENERAL INFORMATION

Display area	408.24 (H) x 255.15 (V)mm (typ.), [48.0 cm (19.0 inches)]
Drive system	a-Si TFT active matrix
Display color	16.7M colors (6bit+Hi-FRC)
Pixel	1,440 (H) x 900(V) pixels
Pixel arrangement	RGB (Red dot、 Green dot、 Blue dot) vertical stripe
Pixel pitch	0.2835 (W) x 0.2835 (H) mm
Signal system	LVDS 2port [RGB :8-bit, Dot clock (CLK), Data enable (DE)]
Power supply voltage	LCD panel signal processing board: 5.0V

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3. BLOCK DIAGRAM (FOR REFERENCE)



Note: System ground(GND), FG (Frame ground) in the product should be connected together in customer equipment.



4. DETAILED SPECIFICATION

4.1 MECHANICAL SPECIFICATIONS

Parameter	Specification	Unit
Display area	408.24(H) x 255.15 (V) mm (typ.), [48.0 cm (19.0 inches)]	mm
Display dot number	1440×3(H) ×900(V)	-
Pixel pitch	0.2835(H)×0.2835(V)	mm
Dot pitch	0.0945(H) ×0.2835(V)	mm
Color arrangement	RGB (Red dot、 Green dot、 Blue dot) vertical stripe	-
Display color	16,777,216(6bit+Hi FRC)	color

4.2 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Rating	Unit	Remarks
Power supply voltage		VDD	-0.3 ~ +6.0	V	Ta = 25°C
Input voltage for signals		VI	-0.3~3.3	V	Ta = 25°C Note1
Storage temperature		Tst	-20 ~ +60	°C	-
Operating temperature	Front surface	TopF	0 ~ +50	°C	Note2
	Rear surface	TopR	0 ~+55	°C	Note3
Relative humidity	Note4	RH	≤95	%	Ta ≤40° C
			≤85		40° C < Ta≤50° C
Absolute humidity	Note4	AH	≤70 Note5	g/m3	Ta > 50° C
Operating altitude		-	≤4, 850	m	0° C≤Ta≤55° C
Storage altitude		-	≤13, 600	m	-20° C≤Ta≤60° C

Note1: Display signals are DA0+/-, DA1+/-, DA2+/-, DA3+/-, CKA+/-, DB0+/-, DB1+/-, DB2+/-, DB3+/-, and CKB+/-.

Note2: Measured at center of LCD panel surface (including self-heat)

Note3: Measured at center of LCD module's rear shield surface (including self-heat)

Note4: No condensation

Note5: Ta = 50°C, RH = 85%

4.3 ELECTRICAL CHARACTERISTICS

4.3.1 Driving for LCD panel signal processing board

(Ta=25°C)

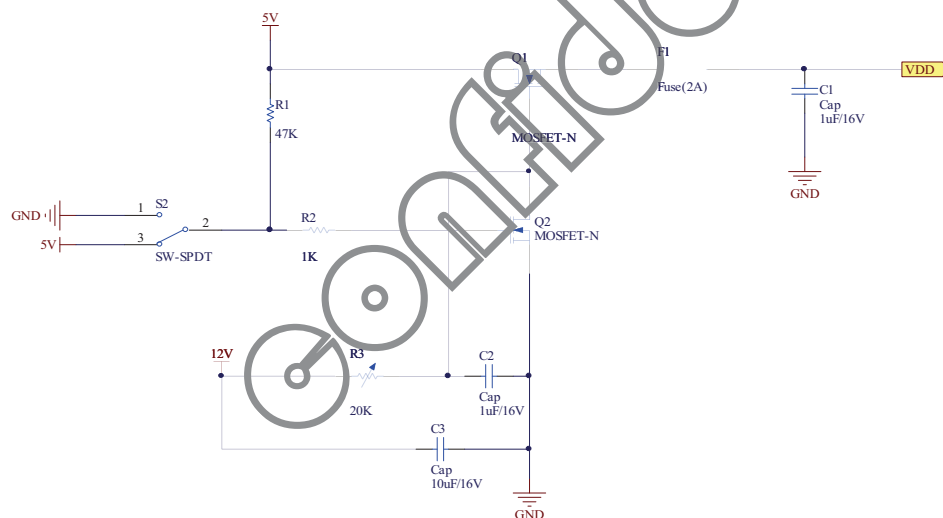
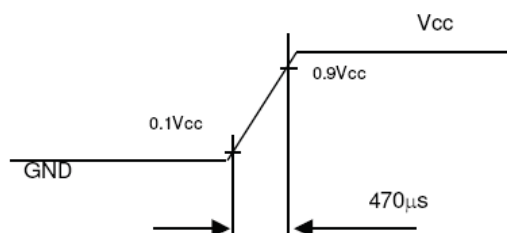
Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VDD	4.5	5.0	5.5	V	-
Power supply current		IDD	-	450 Note1	650 Note2	mA	at VDD = 5.0V
Permissible ripple voltage		VRP	-	-	150	mV	VDD
Differential input threshold voltage for LVDS receiver	Low	VTL	-100	-	-	mV	at VCM = 1.2V Note3
	High	VTH	-	-	+100	mV	
Input voltage width for LVDS receiver		VI	0	-	3.3	V	-
Rush current		I _{rush}	-	-	3.0	A	Note4

Note1: Checked flag pattern (EIAJ ED-2522)

Note2: Pattern for maximum current (2H1V dot inverse, 0/15 scale)

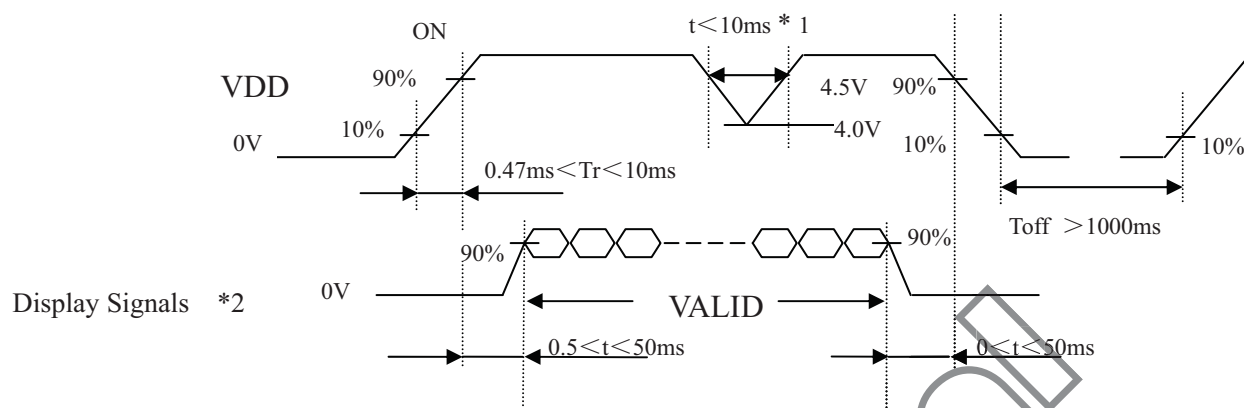
Note3: Common mode voltage for LVDS driver

Note4: Measurement Conditions:

**Vcc rising time is 470μs**

4.4 POWER SUPPLY VOLTAGE SEQUENCE AND RIPPLE

4.4.1 Power supply voltage sequence



*1. When VDD is on, but the value is lower than 4.5V, a protection circuit may work, then the module may not display.

*2 The signal line is not connected with the module, at the end of cable the terminal resistor of 100Ω should be added.

Note1: Display signals (D0+/-, D1+/-, D2+/-, D3+/- and CK+/-) must be "0" voltage, exclude the VALID period (See above sequence diagram). If these signals are higher than 0.3 V, the internal circuit is damaged.

If some of display signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If customer stops the display signals, they should cut VDD.

Note2: When VDD is on, it should be set above 4.0V.



4.4.2 Power supply voltage ripple

When the power supply is designed, the next form can give the reference. If the voltage ripple is over the value in next form, the noise should be seen in display area.

Ripple (Measured at input terminal of power supply)

	VDD(5V to drive the panel)
Ripple voltage	$\leq 150\text{mVP-P}$ (Including spike noise)

4.4.3 Fuse

Parameter	Fuse		Rating	Fusing current	Remarks
	Type	Supplier			
VDD	F0603FA2000V032T	AEM	2A 32V		

Note1: There are different power supply systems from the power input terminal. The power supply capacity should be less than the fusing current. If the power supply capacity is above the fusing current, the fuse may blow in a short time, and then nasty smell, smoking and so on may occur.

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TM-SA-A0020-01-E

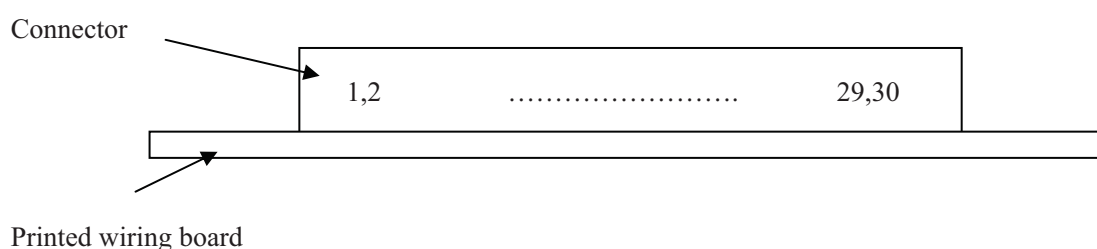
10/25

4.5 INTERFACE AND CONNECTOR PIN ALIGNMENT

CN1: FI-X30SSL-HF (Produced by JAE) or equivalent.

Pin	Name	Description
1	RXO0-	Negative LVDS differential data input. Channel O0 (odd)
2	RXO0+	Positive LVDS differential data input. Channel O0 (odd)
3	RXO1-	Negative LVDS differential data input. Channel O1 (odd)
4	RXO1+	Positive LVDS differential data input. Channel O1 (odd)
5	RXO2-	Negative LVDS differential data input. Channel O2 (odd)
6	RXO2+	Positive LVDS differential data input. Channel O2 (odd)
7	GND	Ground
8	RXOC-	Negative LVDS differential clock input. (odd)
9	RXOC+	Positive LVDS differential clock input. (odd)
10	RXO3-	Negative LVDS differential data input. Channel O3 (odd)
11	RXO3+	Positive LVDS differential data input. Channel O3 (odd)
12	RXE0-	Negative LVDS differential data input. Channel E0 (even)
13	RXE0+	Positive LVDS differential data input. Channel E0 (even)
14	GND	Ground
15	RXE1-	Negative LVDS differential data input. Channel E1 (even)
16	RXE1+	Positive LVDS differential data input. Channel E1 (even)
17	GND	Ground
18	RXE2-	Negative LVDS differential data input. Channel E2 (even)
19	RXE2+	Positive LVDS differential data input. Channel E2 (even)
20	RXEC-	Negative LVDS differential clock input. (even)
21	RXEC+	Positive LVDS differential clock input. (even)
22	RXE3-	Negative LVDS differential data input. Channel E3 (even)
23	RXE3+	Positive LVDS differential data input. Channel E3 (even)
24	GND	Ground
25	GND	Ground
26	NC	Not connection.
27	GND	Ground
28	VCC	+5.0V power supply
29	VCC	+5.0V power supply
30	VCC	+5.0V power supply

CN1: The inserting side is as follows



TM-SA-A0020-01-E

11/25

4.6 LVDS I/F DATA CHART

Input DATA		Transmitter		CN1	
		pin	DS90CF383,C385 or equivalent	pin	Symbol
Odd pixel data and control signals	RA0	→ 51	TXIN0	→ 1	DA0-
	RA1	→ 52	TXIN1	→ 2	DA0+
	RA2	→ 54	TXIN2		
	RA3	→ 55	TXIN3		
	RA4	→ 56	TXIN4	→ 3	DA1-
	RA5	→ 3	TXIN6	→ 4	DA1+
	GA0	→ 4	TXIN7		
	GA1	→ 6	TXIN8	→ 5	DA2-
	GA2	→ 7	TXIN9	→ 6	DA2+
	GA3	→ 11	TXIN12	→ 7	GND
	GA4	→ 12	TXIN13	→ 8	CKA-
	GA5	→ 14	TXIN14	→ 9	CKA+
	BA0	→ 15	TXIN15		
	BA1	→ 19	TXIN18	→ 10	DA3-
	BA2	→ 20	TXIN19	→ 11	DA3+
	BA3	→ 22	TXIN20		
	BA4	→ 23	TXIN21		
	BA5	→ 24	TXIN22		
	RSVD	→ 27	TXIN24		
	RSVD	→ 28	TXIN25		
	DE	→ 30	TXIN26		
	RA6	→ 50	TXIN27		
	RA7	→ 2	TXIN5		
	GA6	→ 8	TXIN10		
	GA7	→ 10	TXIN11		
	BA6	→ 16	TXIN16		
	BA7	→ 18	TXIN17		
	RSVD	→ 25	TXIN23		
	CLK	→ 31	CLKIN		
Even pixel data	RB0	→ 51	TXIN0		
	RB1	→ 52	TXIN1	→ 12	DB0-
	RB2	→ 54	TXIN2	→ 13	DB0+
	RB3	→ 55	TXIN3	→ 14	GND
	RB4	→ 56	TXIN4	→ 15	DB1-
	RB5	→ 3	TXIN6	→ 16	DB1+
	GB0	→ 4	TXIN7	→ 17	GND
	GB1	→ 6	TXIN8	→ 18	DB2-
	GB2	→ 7	TXIN9	→ 19	DB2+
	GB3	→ 11	TXIN12		
	GB4	→ 12	TXIN13	→ 20	CKB-
	GB5	→ 14	TXIN14	→ 21	CKB+
	BB0	→ 15	TXIN15		
	BB1	→ 19	TXIN18	→ 22	DB3-
	BB2	→ 20	TXIN19	→ 23	DB3+
	BB3	→ 22	TXIN20	→ 24	GND
	BB4	→ 23	TXIN21	→ 25	GND
	BB5	→ 24	TXIN22	→ 26	NC
	RSVD	→ 27	TXIN24	→ 27	GND
	RSVD	→ 28	TXIN25	→ 28	VDD
	RSVD	→ 30	TXIN26	→ 29	VDD
	RB6	→ 50	TXIN27	→ 30	VDD
	RB7	→ 2	TXIN5		
	GB6	→ 8	TXIN10		
	GB7	→ 10	TXIN11		
	BB6	→ 16	TXIN16		
	BB7	→ 18	TXIN17		
	RSVD	→ 25	TXIN23		
	CLK	→ 31	CLKIN		



TM-SA-A0020-01-E

12/25

4.7 DISPLAY COLORS AND INPUT DATA SIGNALS

This product can display in equivalent to 16,777,216 colors in 256 scales. Also the relation between display colors and input data signals is as the following table.

Display colors		Data signal (0:Low level 、 1:High Level)																							
		RA7	RA6	RA5	RA4	RA3	RA2	RA1	RA0	GA7	GA6	GA5	GA4	GA3	GA2	GA1	GA0	BA7	BA6	BA5	BA4	BA3	BA2	BA1	BA0
		RB7	RB6	RB5	RB4	RB3	RB2	RB1	RB0	GB7	GB6	GB5	GB4	GB3	GB2	GB1	GB0	BB7	BB6	BB5	BB4	BB3	BB2	BB1	BB0
Basic color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Red scale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	↑				:								:								:				
	↓				:								:								:				
	Bright	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green scale		1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	↑				:								:								:				
Bule scale	↓				:								:								:				
	Bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	

Note: Combination with 8 bit (256 grayscale) R,G,B color signal , the color can be formed.



4.8 INTERFACE TIMING

4.8.1 Timing specification

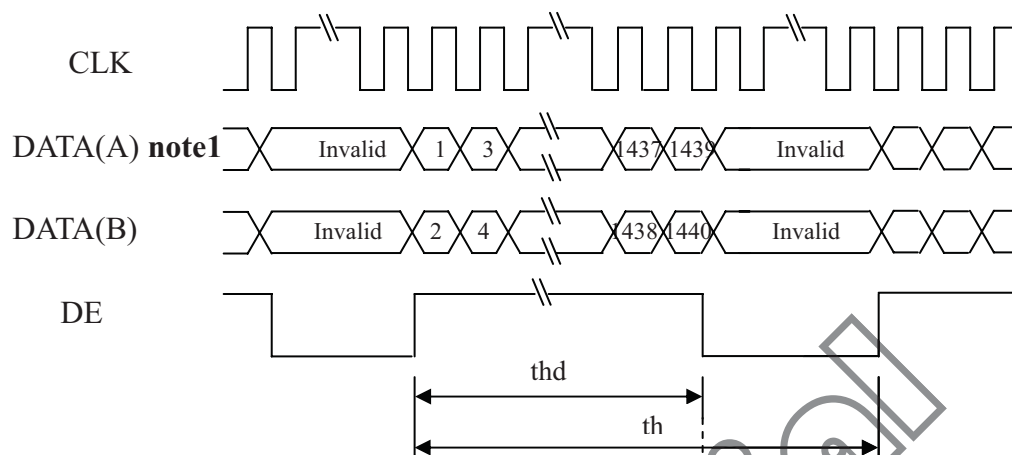
Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Clock	Frequency	1/tc	34.4	44.45	74.25	MHz	LVDS transmitter input
		tc	29.07	22.50	13.47	ns	
	Rise time, Fall time	-	Refer to the timing characteristics of LVDS transmitter			ns	Note 1
	Duty	-				-	
Horizontal signals	Cycle	th	148	18.0	26.5	μs	55.5kHz(typ.)
			754	800	900	CLK	
	Display period	thd	720			CLK	-
Vertical signals	Cycle	tv	13.3	16.67	20	ms	60.0Hz(typ.)
			912	926	1100	H	
	Display period	tvd	900			H	-
DE/Data	Setup time	-	Refer to the timing characteristics of LVDS transmitter			ns	Note 1
	Hold time	-				ns	
	Rise time, Fall time	-				ns	

Note1: See the data sheet of LVDS transmitter.

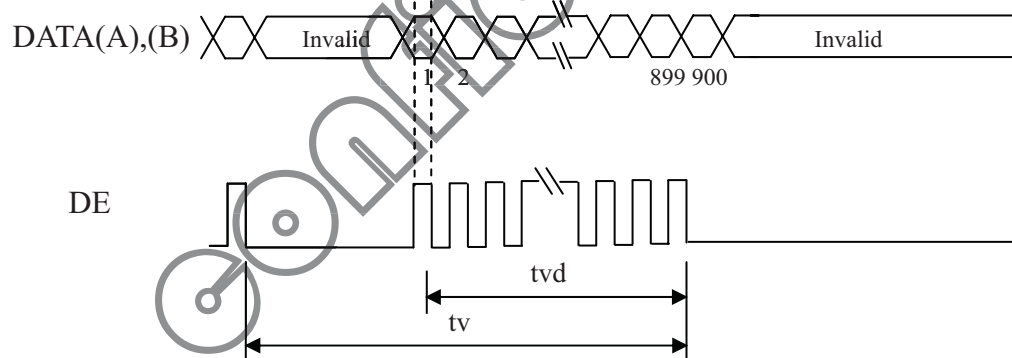
Recommended transmitter:DS90CF383(National Semiconductor)

4.8.2 Input signal timing chart

Horizontal timing



Vertical timing



Note 1: DATA(A)=RA0-RA7,GA0-GA7,BA0-BA7

DATA(B)=RB0-RB7,GB0-GB7,BB0-BB7



4.8.3 Pixel DATA alignment of display image

The following chart is the coordinates of per pixel

Odd Pixel: RA= R DATA

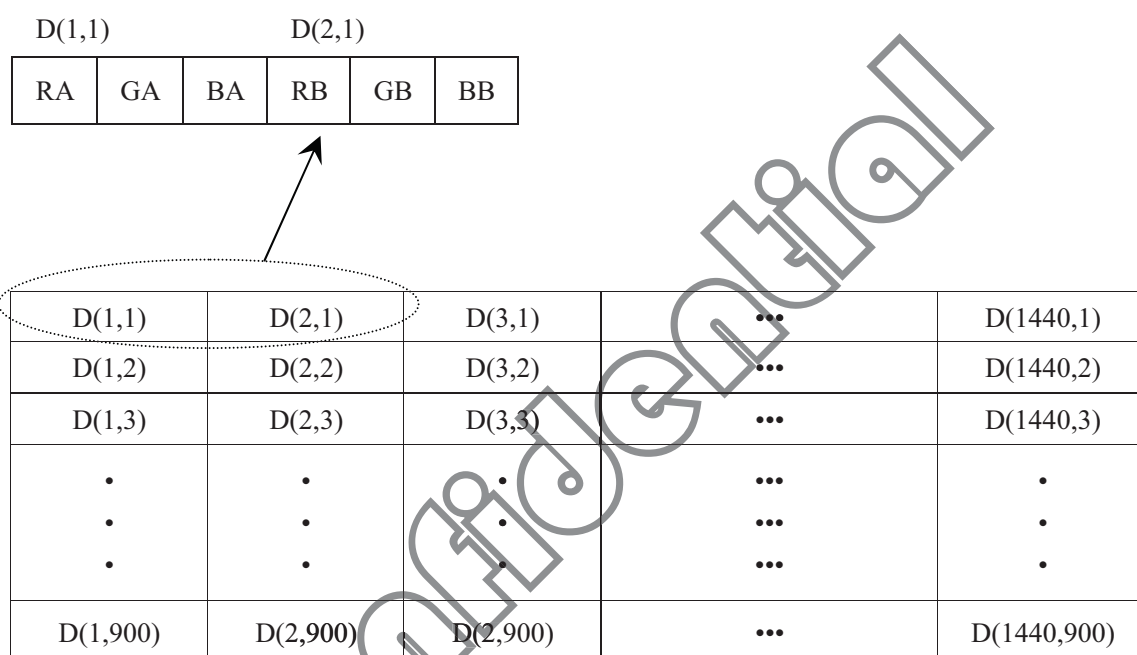
Even Pixel : RB=R DATA

GA= G DATA

GB=G DATA

BA= B DATA

BB=B DATA



4.9 OPTICS(BASED ON TFT LCD MODULE TMS190WX1-19TB)

4.9.1 Optical characteristics

Note1 ,Note2

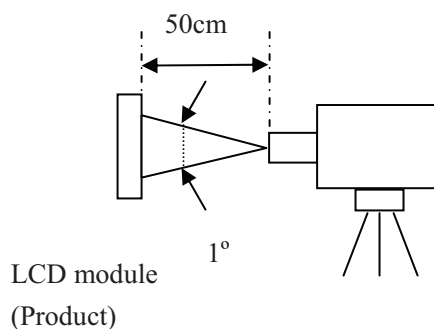
Parameter Note1		Condition	Symbol	min.	typ.	max.	Unit	Remarks
Luminance		White at center θR=0°, θL=0°, θU=0°, θD=0°	L	(250)	300	-	cd/ m²	-
Contrast ratio		White/Black at center θR=0°, θL=0°, θU=0°, θD=0°	CR	(650)	1000	-	-	Note3
Luminance uniformity		White θR=0°, θL=0°, θU=0°, θD=0	LU	-	1.25	(1.33)	-	Note4
Chromaticity	White	X coordinate	Wx	0.283	0.313	0.343	-	Note5
		Y coordinate	Wy	0.299	0.329	0.359	-	
	Red	X coordinate	Rx	0.621	0.6501	0.681	-	
		Y coordinate	Ry	0.303	0.333	0.363	-	
	Green	X coordinate	Gx	0.267	0.297	0.327	-	
		Y coordinate	Gy	0.572	0.602	0.632	-	
	Blue	X coordinate	Bx	0.112	0.142	0.172	-	
		Y coordinate	By	0.047	0.077	0.107	-	
Color gamut		θR=0°, θL=0°, θU=0°, θD=0 At center,against NTSC	C	(70)	72	-	%	
Response time		White to black	Ton	-	1.3	(2.6)	ms	Note6
		Black to white	Toff	-	3.7	(7.4)	ms	
		Ton+ Toff	-	-	5	(10)	ms	Note7
Viewing angle	Right	θU=0°, θD=0°, CR≥10	θR	(75)	85	-	°	Note8
	Left	θU=0°, θD=0°, CR≥10	θL	(75)	85	-	°	
	Up	θR=0°, θL=0°, CR≥10	θU	(70)	80	-	°	
	Down	θR=0°, θL=0°, CR≥10	θD	(70)	80	-	°	

Note1: The values in upper table are based on backlight provided by SAO.

Note2: Measurement conditions are as follows.

Ta=25°C , VDD=5.0V , IBL=6.5mA/m²/lamp , Display mode : WXGA+ , Horizontal cycle=55.56KHz, Vertical cycle=60.0Hz

Optical characteristics are measured at luminance saturation after 30minutes from working the product in the dark room. Also measurement method for luminance is as follows.



Luminance Meter (TOPCON BM-5A)
Spectroradiometer(TOPCON SR-3)

Note 3: See “4.9.2 Definition of contrast ratio”.

Note 4: See “4.9.3 Definition of luminance uniformity”.

Note 5: CIE 1931 Chromaticity Diagram Standard.

Note 6: Product surface temperature: TopF = 33.0 °C

Note 7: See “4.9.4 Definition of response time”.

Note 8: See “4.9.5 Definition of viewing angle”.

4.9.2 Definition of contrast ratio

The contrast ratio is calculated by using the following formula.

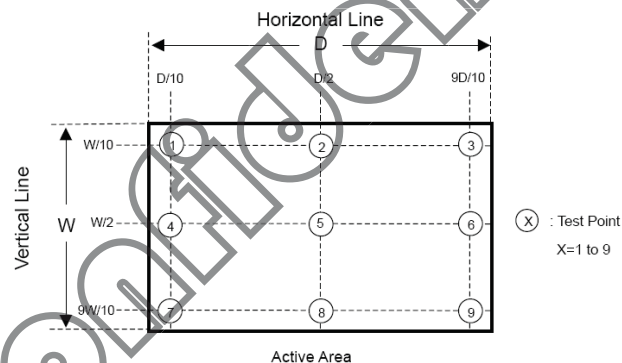
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance of white screen}}{\text{Luminance of black screen}}$$

4.9.3 Definition of luminance uniformity

The luminance uniformity is calculated by using the following formula.

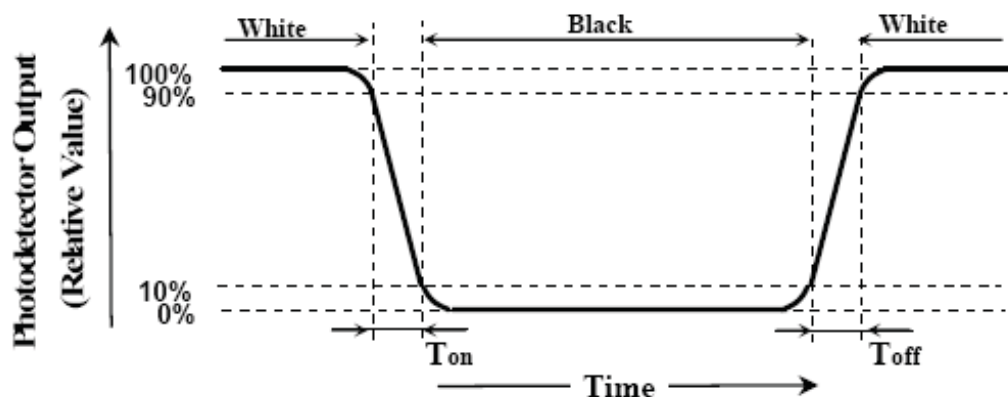
$$\text{Luminance uniformity (LU)} = \frac{\text{Maximum luminance from ① to ⑨}}{\text{Minimum luminance from ① to ⑨}}$$

The luminance is measured at near the 9 points shown below.



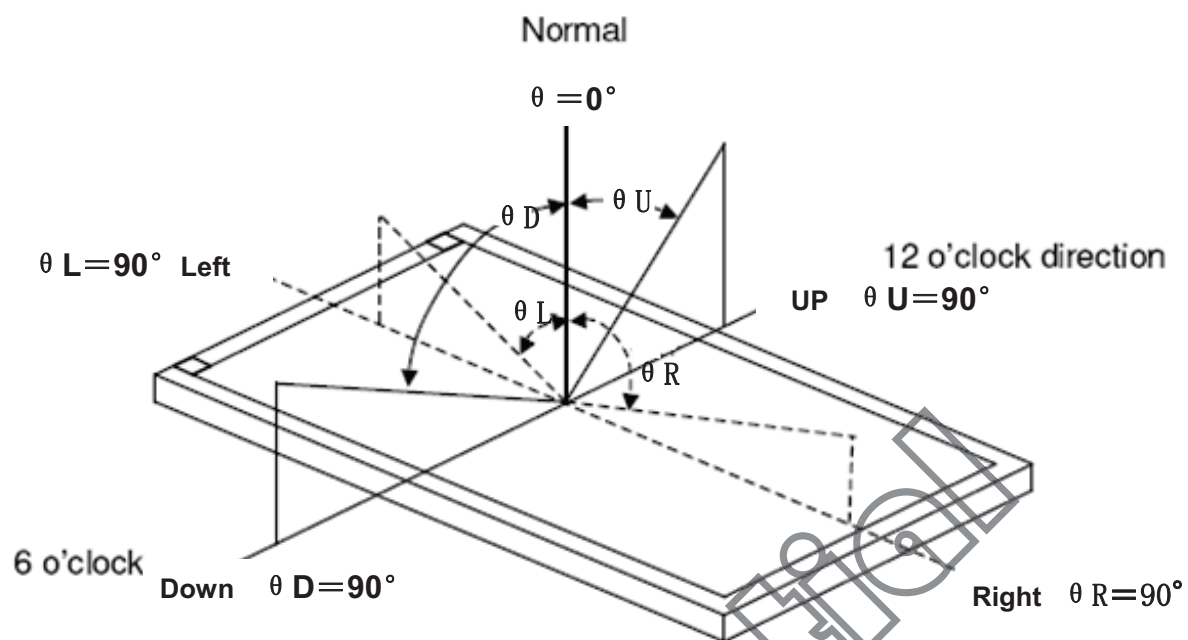
4.9.4 Definition of response time

Response time is measured, the luminance changes from “white” to “black”, or “black” to “white” on the same screen point, by photo-detector. Ton is the time it takes the luminance change from 90% down to 10%. Also Toff is the time it takes the luminance change from 10% up to 90%. (See the following diagram.)





4.9.5 Definition of viewing angle





TM-SA-A0020-01-E

19/25

4.9.6 B/L SPEC. for TMS190WX1-19TB (For reference)

Parameter		Symbol	Condition	Min.	Typ.	Max.	unit	Remarks
Luminance (center)		L	I FL=6.5mA, 50kHz /25±3℃	5600	5800	—	cd / m2	Upright the B/L , then test at light-emitting area after 30min.
Luminance uniformity	Five point	ΔL1	I FL=6.5mA, 50kHz /25±3℃	68%	—	—	%	
	Nine point	ΔL2	I FL=6.5mA, 50kHz /25±3℃	80%	83%	—	%	
	Visual	—	—	To manage according to the lowest accepted spec.			—	-
Color gamut		X	I FL=6.5mA, 50kHz /25±3℃	0.281	0.296	0.311	—	-
		Y	I FL=6.5mA, 50kHz /25±3℃	0.286	0.301	0.316	—	-
Color uniformity		ΔCUX	I FL=6.5mA, 50kHz /25±3℃	—	—	1.05	—	Note1
		ΔCUY	I FL=6.5mA, 50kHz /25±3℃	—	—	1.06	—	-

Note1

Luminance uniformity 1	(the min. luminance of 1~13point) / (the max. luminance of 1~13point) *100%
Luminance uniformity 2	(the min. luminance of 1~9point) / (the max. luminance of 1~9point) *100%
Color uniformity	(the max. luminance of 1~13point) / (the min. luminance of 1~13point)

TM-SA-A0020-01-E

20/25

5. MARKINGS, PACKING, TRANSPORTATION AND DELIVERY

SAO will pack products to deliver to customer in accordance with SAO packing specifications, and will deliver products to customer in such a state that products will not suffer from damage during transportation .The delivery conditions are as follows.

5.1 PRODUCT LABEL

Product label



Open cell barcode:

•Example: 9WX2218C23916121011H6H109505003

<u>9WX22</u>	<u>18C239161210</u>	<u>11H6H109505003</u>
Open cell Number Code	Cell ID	Lot number

Cell ID: 18C239161210

Jan. to Sep.: Number of month
October: A
November: B
December: C

<u>1</u>	<u>8</u>	<u>C</u>	<u>23</u>	<u>9161210</u>
S1 Line	Manufacturing year (e.g:A.D2008 is 08.)	Manufacturing month 1 letter	Manufacturing day	Panel Location Internal use

Lot number: 11H6H109505003

Jan. to Sep.: Number of month
October: A
November: B
December: C

<u>11H6H1</u>	<u>09</u>	<u>5</u>	<u>05</u>	<u>003</u>
Internal use	Manufacturing year 2 figures of the A.D. end numbers (e.g: A.D2009 is 09.)	Manufacturing month 1 letter	Manufacturing day	Production number Multi-letter (figure)



5.2 PACKING

(1) Packing box

5 products are packed up with the maximum in a packing box(See “**5.6 OUTLINE FIGURE FOR PACKING**”).

Products are put into a plastic bag for prevention of moisture.

The type name and quality are shown on outside of the packing box, either labeling or printing.

(2)Pallet Packing (See”**5.6 OUTLINE FIGURE FOR PACKING**”)

① Packing boxes are tired on a cardboard pallet.

②Cardboard sleeve and top cap are attached to the packing boxes, then they are fixed by a band.

5.3 INSPECTION RECORD SHEET

Inspection record sheets are included in the packing box with delivery products to customer. It is summarized to a number of products for pass/fail assessment.

5.4 TRANSPORTATION

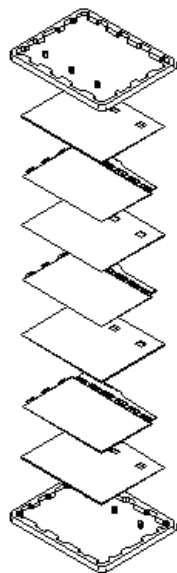
The product is transported by vehicle, aircraft or shipment in the state of pallet packing.

5.5 SIZE AND WEIGHT FOR PACKING BOX

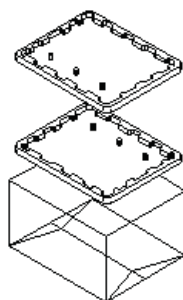
Parameter	Packing box	Unit
Size	620*526*552	mm
Weight	0.42 (type)	kg
Total weight	16.8 (type) (with 24 PCS panel)	kg

5.6 OUTLINE FIGURE FOR PACKING (For reference)

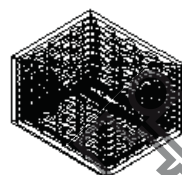
Packing box and pallet packing



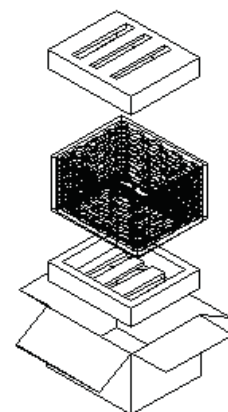
1. Three open cells
each tray



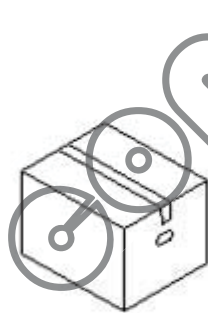
2. Put trays in
the box



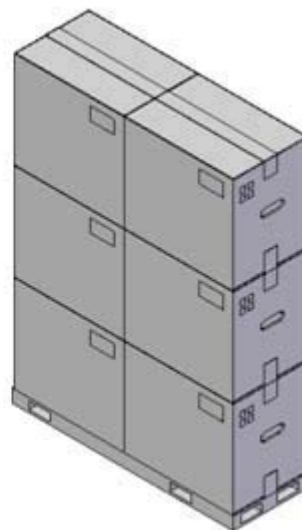
3. Tray package



4. Full carton with
two spacers
(top and bottom)



5. Packing box



6. Pallet packing
(2 boxes×3 tiers maximum)

Cardboard pallet

Note: The ways for Packing and Shipping vary from different shipment volume, dependent on specific situations.



6.PRECAUTIONS

6.1 ASSEMBLY AND HANDLING PRECAUTIONS

- 1) Take the measures of electrostatic discharge such as earth band, ionic shower and so on, when customer deal with the product, because products may be damaged by electrostatic.
- 2) Do not operate or store in high temperature, high humidity, dewdrop atmosphere or corrosive gases. Keep the product in antistatic pouch in room temperature, because of avoidance for dusts and sunlight, if customer stores the product.
- 3) In order to prevent dew condensation occurring by temperature difference, the product packing box must be opened after leave under the environment of an unpacking room temperature enough. Because a situation of dew condensation occurring is changed by the environment temperature and humidity, evaluate the leaving time sufficiently. (Recommendation leaving time: 6 hour or more with packing state)
- 4) This product is not designed as radiation hardened.
- 5) To assemble backlight or install module into user's system ,it should be in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- 6) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- 7) It is dangerous that moisture come into or contacted the product, because moisture may damage the product when it is operating.
- 8) High temperature or humidity may reduce the performance of module. Please store this product within the specified storage condition.
- 9) When ambient temperature is lower than 10℃ may reduce the display quality. For example , the response time will become slowly.
- 10) Do not apply rough force such as bending or twisting to the product during assembly.
- 11) It's not permitted to have pressure or impulse on the module because the LCD panel will be damaged.
- 12) Do not pull the I/F connector in or out while the module is operating.
- 13) After the product's end of life, it is not harmful in case of normal operation and storage.

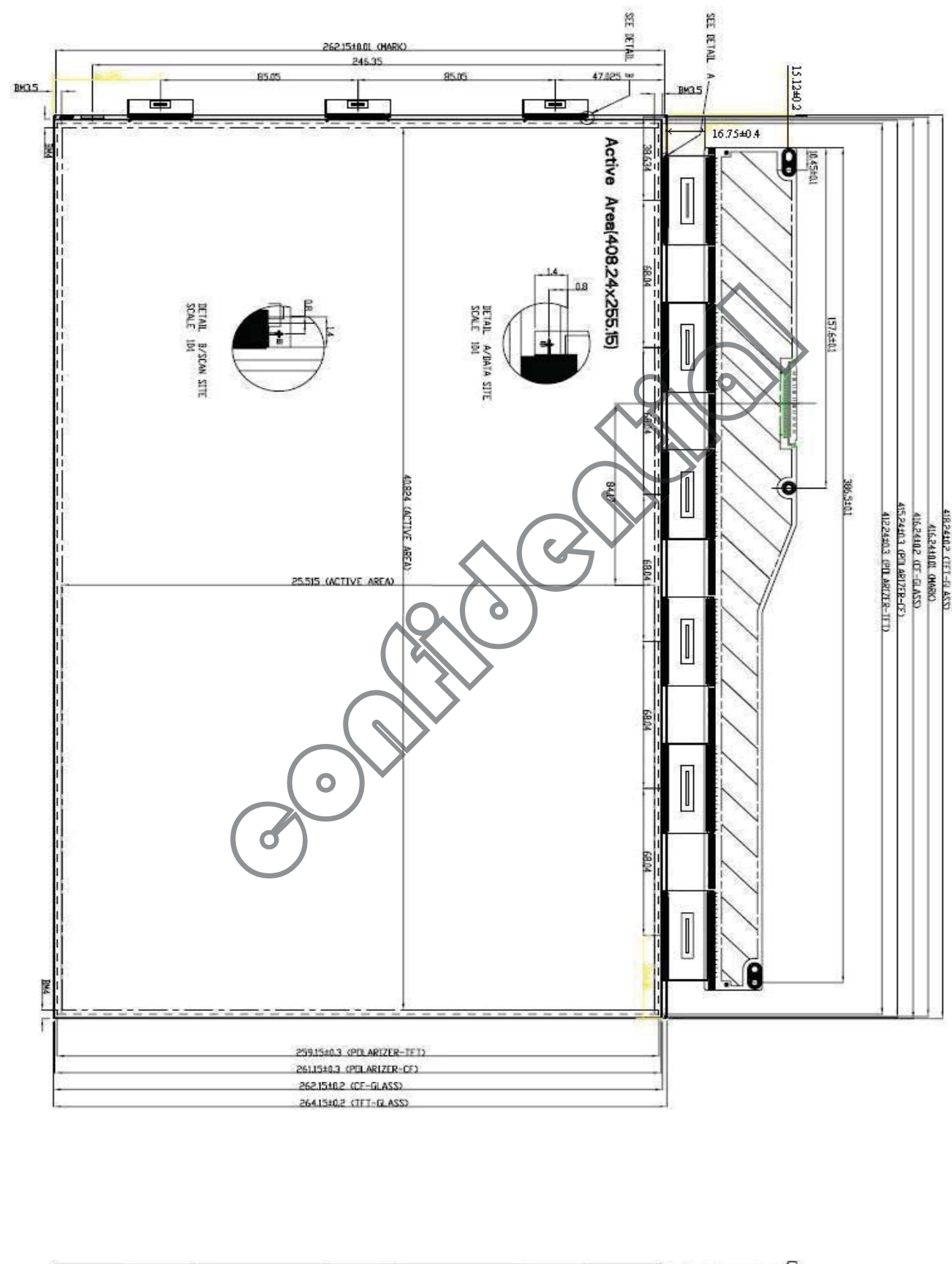
6.2 OTHER

All GND and VCC terminals should be used without a non-connected line.

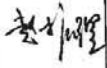
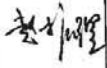
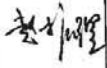
The following items are neither defects nor failures.

- 1) Response time, luminance and color may be changed by ambient temperature.
- 2)The LCD may be seemed luminance non-uniformity, flicker, vertical seam or small spot by display patterns.
- 3)The interference noise of input signal frequency for this product and luminance control frequency of customer's backlight inverter may appear on a display. Set up luminance control frequency of backlight inverter so that the interference noise does not appear.

7. OUTDRAWING





				TM-SA-A0020-01-E		25/25										
Rev	Revised date	Main Revision item and sign				Approved by	Checked by	Prepared by	Published date							
1.0	2010-4-9	<table border="1"><tr><td rowspan="2">Sign</td><td>品管</td><td>营业</td><td></td></tr><tr><td></td><td></td><td></td></tr></table>				Sign	品管	营业					Shun Jiang	Anfernee Du	Stephen Sun	2010-4-9
Sign	品管	营业														
																

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Shanghai AVIC OPTOELECTRONICS Co., Ltd.